IP Phones and IP Lines Configuration for Quadro IP PBXs

Abstract: This document describes the difference between Lines, Extensions, IP-Lines, Remote Extensions and how to use IP Phones as IP Line Extensions to Quadro2x/4x/16x, SW version 3.0 and higher.

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1 Introduction

Every Quadro IP PBX (2x, 4x, 16x) provides the possibility to connect IP phones in addition to the standard FXS phones. The IP phones will be connected via Ethernet to the Quadro LAN port (Figure 1: IP Phones and Quadro) and serve as additional phones similar to the FXS extensions. This document describes the configuration steps that are necessary to setup both the Quadro and the IP phones. The scope of this document does not cover specific brands or even vendors of IP phones, but should give a general overview and a guideline.

Chapter 2 General Information provides some additional information for an IP phone scenario. It gives answers to general questions. Chapter 3 Configuring the Quadro and Chapter 4 Configuring the IP Phones will then describe detailed configuration steps based on this information. The steps shown in Chapter 3 are illustrated with actual screenshots of a Quadro 4x (running firmware version 3.0.37). 2x and 4x/16x models are identical concerning the topics covered here. Older or even newer firmware version might differ slightly in aspect of the GUI.
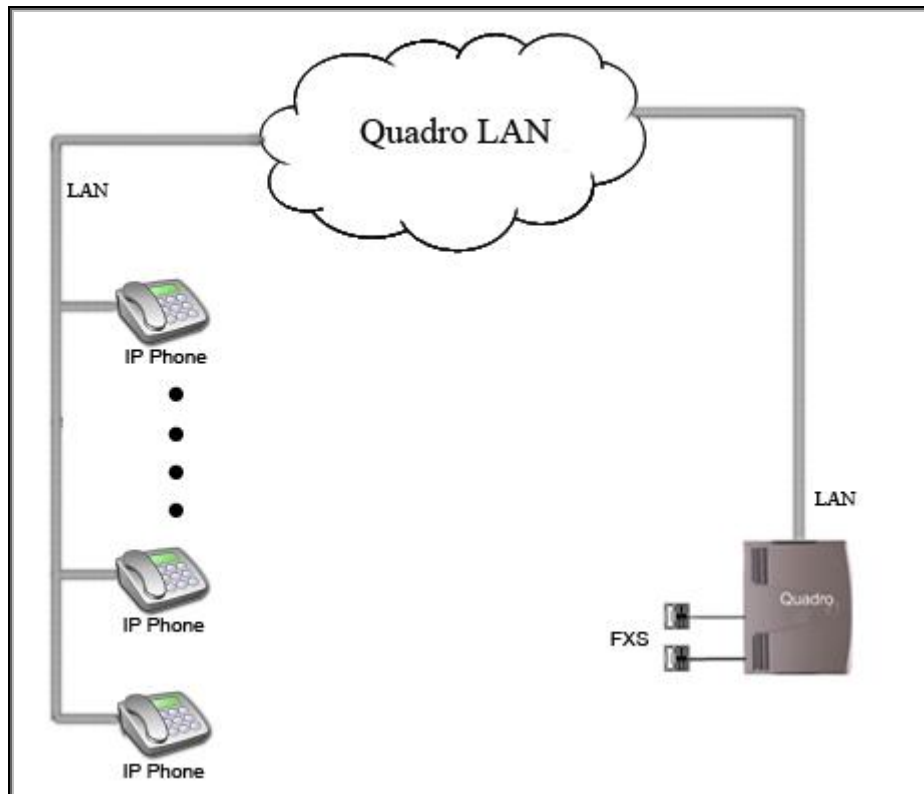

Figure 1: IP Phones and Quadro

2 General Information

Before going into detail, some EPYGI terminology will be explained.

2.1 Lines

With lines we refer to the connection to a phone. There are 2 types of lines on the Quadro:

- FXS lines – these are the lines to which analog phones can be attached.
  The connectors on the backplate for these lines are labeled phone 1, phone 2...
- IP lines - these are not real connectors, but they serve the same purpose, they are connecting an IP phone which is located in the LAN of the Quadro to the Quadro.

All configuration steps regarding lines can be done by following this menu:
Telephony -> Line Settings. On this page there are 2 different sections:

- Onboard Line Settings - referring to the FXS lines.
  They are identified by the Line number, which is similar to the labelling on the back plate.
  For example:
  > Line 1 <---> phone 1
  > Line 2 <---> phone 2

- IP Line Settings - the IP lines. The IP-lines cannot be identified so easy, as all of the IP-phones are connected to the LAN. So it means they are identified implicitly by their username/password combination.
  Lets say you are editing the IP Line 3 and you are defining the username: snom-3, then the IP-phone, which will contact the Quadro with this username, will be assigned to this line.
  So to get not confused with we advise to follow some fixed naming scheme.

Without going into detail, line settings are including only physical details of the phone or how it is connected to the Quadro. Just examples:

- FXS line settings: Type of CallerID transmission.
- IP line settings: Username/password to connect to the Quadro.

A line itself cannot be called, unless it is connected to an extension.

2.2 Extension

An extension on Quadro IP-PBX is a complex thing, so simply some mixed facts will be listed to clear the picture step by step.

- First of all, extensions are named by 2 digit numbers between 10 and 79.
  As a special extension the Auto Attendant has the number 00.
- There can be as much extensions as fit in this number space.
- Each extension can be seen as a Quadro user. It means the extension user can log into the GUI with the extension number and a password. (If set)
- Each extension can be called locally by its 2-digit number. (Unless the administrator did not change that in the call routing table.)

- It is possible (and needed in most cases) to attach a line to an extension. It can be either an FXS line or an IP line. Only if a line is attached to an extension you will be able to make a call from this extension. If no line is attached to an extension, then it is called a Virtual Extension (VE – see 2.3 Virtual Extension. By default all extensions have lines attached already.
- Each extension may have voice mail, with its own greeting messages and individual settings.
- Each extension has the full set of configurable supplementary services, like
    - call blocking
    - call forwarding
    - many extension ringing
    - …
- Each extension may register at an individual external SIP server (by default all extensions are registered at sip.epygi.com)
- Each extension (except VEs) may have a Remote Extension.

2.3 Virtual Extensions

Actually a Virtual Extension (VE) is just an extension to which no line is attached at the moment.
So you can attach a line and it will become a real extension and vice versa. Here we will just list the differences to a real extension and the benefit of a VE.

Differences between VEs and real extensions:

- A VE cannot have a remote extension. This is done on purpose and has no technical reason.
- You cannot dial from a VE, as there is nothing attached to start a call.
- You can call to a VE, but nothing is going to 'ring' (until you have supplementary services defined for this VE, see below).

What can be done with VEs?
Many things, just some will be briefly listed here.

- Group calling. Lets say you have a sales department and you want to have a number to call to all of them at the same time.
  You create a virtual extension like 66, and activate Many Extension Ringing, by adding the numbers you want to include.
- Forwarding to frequent used destinations.
- Use to register at a ITSP and share this between all extensions
- Other functions like hunting, day / night routing.

2.4 Remote Extensions

For every extension, which is not a VE, you can define a Remote Extension (RE).

More precisely this is not a new extension, but an IP-line, which is connecting an IP-phone from the remote Internet to the extension. This remote line can be used alternately to the line connected to the extension.

Example:
Extension 12 has FXS line 2 attached. It means if somebody is calling to 12, then the analog phone, which is plugged into port "Phone 2", will start ringing.

Now the user of extension 12 is activates the RE. Once this RE is setup and the IP-phone from remote (hotel, home, other office) is registered at the Quadro, calls to the extension 12 will not ring the analog phone as before, but the remote IP-phone.

Once the remote IP-phone becomes un-registered, the analog phone will be operational again.

2.5 Small Sample Configuration

This sample configuration is just illustrating how lines, extensions, virtual extensions, ip-phones and remote extensions form the whole picture. Additionally it servers as the configuration example listed below. The left side of the illustration shows the internal connectivity of the Quadro, whereas the right side shows the external connections. The box in the middle illustrates the Quadro itself interconnecting everything.
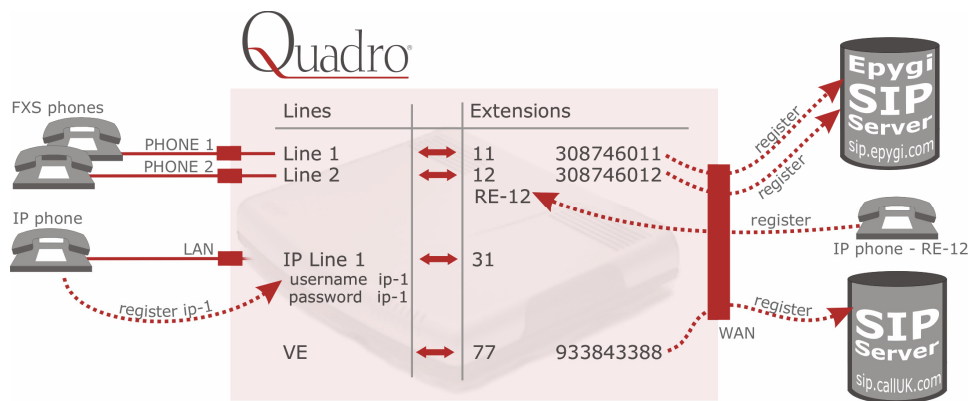

Figure 2 - Configuration example

Below the same setup in a table view:

Lines			Extensions			
Type	**Name**	**Config**	**Number**	**External Server**	**External Name**	**Remote Extension**
FXS	Line 1	FSK…	11	sip.epygi.com	308746011	none
FXS	Line 2	FSK…	12	sip.epygi.com	308746012	usern: re-12 passw: re-12
IP	IP Line 1	SIP phone usern: ip-1 passw: ip-1	31	sip.epygi.com	308746031	none
Virtual			77	sip.calluk.com	933843388	none

Usernames and Passwords:

A lot of different username/password combinations are used within this scenario, so it is easy to get confused. There is a maximum of 4 pairs within this configuration. Make sure they match in pairs and remember they are case sensitive.

IP phone <-> IP Line settings This pair is used by the IP phone in the LAN to register at the Quadro.	
IP phone: The naming convention is different for different brands of IP-phones. On Snom phones it is: Account, Password	Quadro: IP line settings on the Quadro. Telephony -> Line settings -> IP line settings. On the Quadro it is named: Username, Password
User GUI <-> Quadro extension This pair is used to log in as an extension to the GUI of the Quadro with a WEB browser.	
Using a WEB browser, asked for: Username / Extension, Password	Quadro: User management and extension settings Extension, Password
SIP server Account <-> Quadro extension This pair is used to register the Quadro at an external SIP server	
Each SIP service has its own terminology. Typically are: Account, Username, DID, SIP username… Password	Quadro: User management and extension settings Registration User Name Registration Password
IP phone as RE <-> Quadro extension This pair is needed if you want an IP-pone to register as a remote extension	
IP phone: The naming convention is different for different brands of IP-phones. On Snom phones it is: Account, Password	Quadro: User management and extension settings -> SIP remote extension settings: User Name Password

This document focuses on the most common setup; using IP phones as Quadro extensions. In this case the Quadro acts as a SIP REGISTRAR server for the IP phones.

The setup is therefore a 3-step procedure.
- First we configure the IP Line settings on the Quadro, allowing an IP phone to register to this line.
- Then we create an extension on the Quadro and attach the previously configured IP line to this extension.
- Then we configure the IP phone itself to register at the IP Line of the Quadro.

Once the IP phone is successfully registered to the Quadro it can utilize the same features as a normal extension. (e.g., voice mail, call routing, call hold, waiting, transfer, etc.)

An optional step, which is not related to IP Lines: This Quadro extension can finally register to an external SIP server just like any other extension.

3 Configuring the Quadro

3.1 IP Line Settings

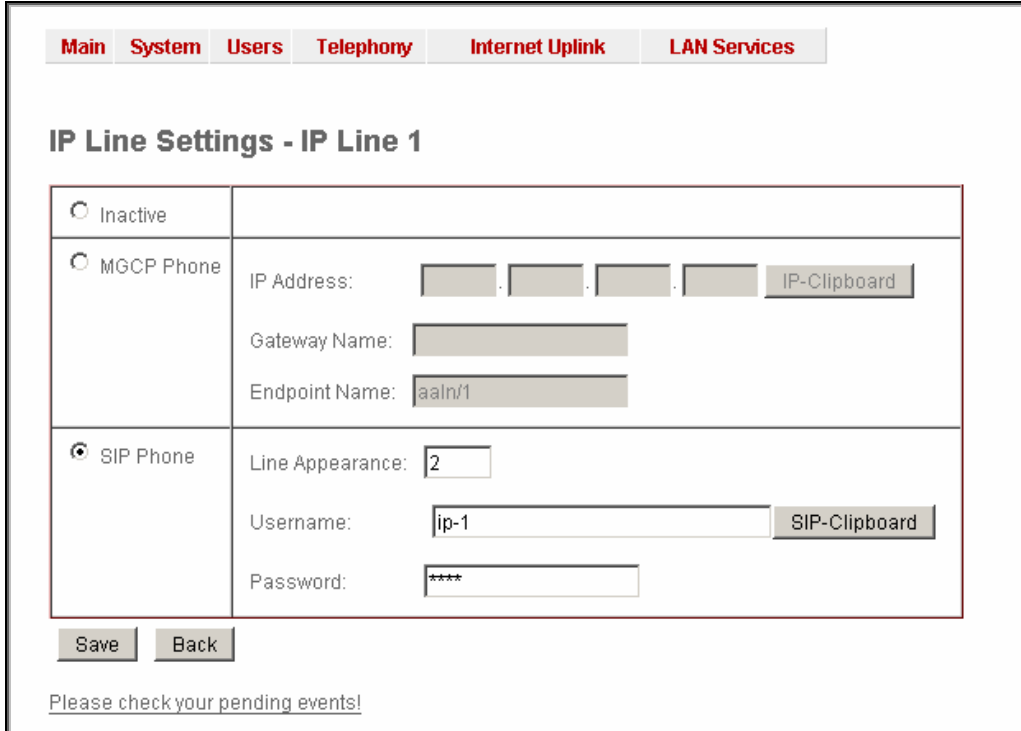Log in as admin and open **Telephony -> Line Settings -> IP Line Settings** and click on **IP Line 1**.

Figure 3 - IP Line settings

Fill the form according to the screenshot.

3.2 Attach This IP Line to an Extension

By default the Quadro comes with a couple of extensions, some of them have attached FXS lines and some of them (starting from 31) have attached IP Lines.

The Extensions Management page can be found following **Users -> User Management and Extension Settings**.

To verify/edit the settings of extension 31, tick the checkbox in the leftmost column of the extension and click the **Edit** link at the top of the table. Check the "Attached Line" listbox to make sure it is set to IP Line 1.

To follow this part of our example also make sure the data for the external SIP server is correct. See the Figure 4: Extension Management below:

Figure 4: Extension Management

4 Configuring the IP Phones

Now we need to configure the IP Phone so that it can register to the Quadro. Therefore the most of the following values have to be set to either match the corresponding values set on the Quadro before or must be set to reflect the Quadro itself (for example the Quadro LAN IP).

The available IP Phones behave very different from vendor to vendor. Some of them must be configured using the keypad of the phone, others need to download a configuration file, and others may

have a WEB GUI. Details for individual brands can be downloaded from the tech support section of our website.

In general following options have to be configured on the IP phone.

1. **Proxy IP:** This is the IP address of the proxy server. Enter Quadro's LAN IP address here. By default this is 172.30.0.1

2. **Proxy Port** This is the SIP proxy server's port number. (Default: 5060).

3. **Registrar IP** This is the IP address of the SIP registrar. Again the Quadro LAN IP (Default: 172.30.0.1)

4. **Registrar Port** This is the SIP registrar's port number. (Default: 5060).

5. **User Name** Enter the same user name that has been entered into the **IP Lines Setting** pages (here: ip-1).

6. **Display Name** This is used in the display name field of the **From** SIP header field. Some IP PBX systems use this as caller ID and some may overwrite it with the string that is set on the PBX system.

7. **Password** The password that is used to register. Enter the same password as on the **IP Lines Setting** pages (e.g. ip-1).